Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_

**AP Biology Final Exam: Wisconsin Fast Plants Summary Report**

Osbourn Park High School, 2015-2016

***Overall Directions and Due Dates:*** Students that are not exempt from the final exam will be completing the following summary report for our Wisconsin Fast Plants experiment. The summary report will be completed in four parts (two paragraphs each) with four separate deadlines. The deadline for the final part (Paragraphs 7 and 8) will be the senior exam date for your class at the end of the exam period. The deadlines for each part of the report are given in the chart below. A rubric for all parts of the report is given at the end of this document.

|  |  |
| --- | --- |
| **Part of the Report** | **Due Date** |
| Part 1 (Paragraphs 1 and 2) | Monday, May 16th (1st, 5th, and 7th periods; due at the beginning of your class period) |
| Part 2 (Paragraphs 3 and 4) | Tuesday, May 24th (5th and 7th periods; due at the beginning of your class period)  Wednesday, May 25th (1st period; due at the beginning of your class period) |
| Part 3 (Paragraphs 5 and 6) | Monday, May 30th (1st, 5th, and 7th periods; due at the beginning of your class period) |
| Part 4 (Paragraphs 7 and 8) | Friday, June 3rd (1st period; due at the end of your exam period)  Monday, June 6th (5th period; due at the end of your exam period)  Wednesday, June 8th (7th period; due at the end of your exam period) |

***Summary Report Description:*** Descriptions of the requirements for each part of the summary report are given in the space below and on the next two pages.

***Part 1:***

**Paragraph 1:** Anatomy Basics

1. Identify three key anatomical structures found in Wisconsin Fast Plants.

*\*\*\*Note: At least one structure should be a reproductive structure.\*\*\**

1. Use text and photographs or diagrams (not hand-drawn) to describe these structures. Your text descriptions should allow the reader to picture the structure vividly without consulting your photographs or diagrams. If your photographs or diagrams are taken from the internet, you must cite them by including a caption that states “image courtesy of…” followed by the web address where you found the image.
2. Identify the function of each structure.
3. Explain how a particular feature of each structure contributes to its function. Example features you may choose are cell types within the structure, organization of cells within the structure, shape of the structure, etc.

**Paragraph 2:** Quantitative Traits and Descriptive Statistics

1. Identify the quantitative trait you chose to measure/count.
2. Provide a chart to show the data you collected for this trait.
3. State the following statistical values for your data set and explain the meaning of each value—mean, standard deviation, standard error, and 95% confidence limit.

*\*\*\*Note: In the appendix of your report, you must show your calculations for standard error and 95% confidence limit.\*\*\**

***Part 2:***

**Paragraph 3:** Parent Generation Plants

1. Describe the difference between the stem colors of the P1 and P2 plants. Include photographs to support your description.
2. Describe the difference between the leaf colors of the P1 and P2 plants. Include photographs to support your description.

**Paragraph 4:** F1 Generation Plants

1. Identify the stem and leaf colors of your F1 plants.
2. State which stem color is dominant and which is recessive. Include a monohybrid Punnett square and text explanation to justify this statement. To create a Punnett square, you will need to assign each stem color a dominant allele (“A”) or recessive allele (“a”). Keep in mind that both parents are purebred for the trait of stem color (i.e., one parent is homozygous dominant and the other is homozygous recessive).
3. State which leaf color is dominant and which is recessive. Include a monohybrid Punnett square and text explanation to justify this statement. To create a Punnett square, you will need to assign each leaf color a dominant allele (“B”) or recessive allele (“b”). Keep in mind that both parents are purebred for the trait of leaf color (i.e., one parent is homozygous dominant and the other is homozygous recessive).
4. Identify the genotype (e.g., AABB) of your F1 plants.
5. Provide a dihybrid Punnett square to show the passage of BOTH stem color and leaf color from the parent generation to the F1 generation.

***Part 3:***

**Paragraph 5:** Life Cycle

1. Identify the purpose of pollination.
2. Describe the process of pollination, and identify the plant structures involved.
3. Explain how you pollinated your F1 plants.
4. Describe observable changes that you saw in the plant between pollination and seed harvesting. State how long this process typically takes in Wisconsin Fast Plants.

**Paragraph 6:** F2 Generation Plants

1. Show a Punnett square depicting a dihybrid cross between the F1 plants and state your expected F2 phenotype frequencies (as fractions and decimals rounded to the nearest thousandth).
2. Provide a chart to show your observed phenotype (i.e. stem and leaf color) data for the F2 plants (as whole numbers of plants AND decimal frequencies rounded to the nearest thousandth).
3. Describe how your observed frequencies differ from your expected frequencies.

***Part 4:***

**Paragraph 7:** Chi Square Set-Up

1. State your null hypothesis and alternate hypothesis.
2. Identify your observed values for the F2 generation phenotype frequencies (as whole numbers of plants).
3. Identify your expected values for the F2 generation phenotype frequencies (as whole numbers of plants) and explain how you determined these values using your Punnett square results from Paragraph 6, Part A.
4. State your calculated chi square value.

*\*\*\*Note: In the appendix of your report, you must show your calculations for the chi square value. You do not need to show calculations for obtaining your expected values, since you already explained how you obtained them in Part C.\*\*\**

1. State your critical value and explain how you determined this value using a critical values chart.

*\*\*\*Note: In this explanation you must identify the number of degrees of freedom for your data and explain how you determined this number.\*\*\**

**Paragraph 8:** Chi Square Analysis

1. State whether your calculated chi square value is higher or lower than your critical value.
2. Explain how your value from Part A allows you to draw conclusions. (Do you reject or support your null hypothesis? Do you reject or support your alternate hypothesis?)
3. Explain what these conclusions “mean” in the context of this experiment. (Does it seem that our fast plants follow a simple dominant / recessive pattern of inheritance for the traits of stem and leaf color?)

**AP Biology Final Exam: Wisconsin Fast Plants Summary Report RUBRIC – Part 1**

Osbourn Park High School, 2015-2016

**Paragraph 1:** Anatomy Basics

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Identify three key anatomical structures found in Wisconsin Fast Plants.  *\*\*\*Note: At least one structure should be a reproductive structure.\*\*\** | * You have correctly identified structure #1. * You have correctly identified structure #2. * You have correctly identified structure #3. | /3 |
| B. Use text and photographs to describe these structures. Your text descriptions should allow the reader to picture the structure vividly without consulting your photographs. | * You have included at least one clear and relevant photograph or diagram for structure #1. (If the image is taken from the internet, you have cited it according to the directions). * You have included at least one clear and relevant photograph or diagram for structure #2. (If the image is taken from the internet, you have cited it according to the directions). * You have included at least one clear and relevant photograph or diagram for structure #3. (If the image is taken from the internet, you have cited it according to the directions). * Your text description for structure #1 is clear, accurate, and thorough. * Your text description for structure #2 is clear, accurate, and thorough. * Your text description for structure #3 is clear, accurate, and thorough. | /6 |
| C. Identify the function of each structure. | * Your function for structure #1 is clearly stated and accurate. * Your function for structure #2 is clearly stated and accurate. * Your function for structure #3 is clearly stated and accurate. | /3 |
| D. Explain how the shape, molecular composition, location, etc. (choose one!) of each structure contributes to its function. | * Your explanation of the connection between a particular feature of structure #1 and its function is clear, accurate, and thorough. * Your explanation of the connection between a particular feature of structure #2 and its function is clear, accurate, and thorough. * Your explanation of the connection between a particular feature of structure #3 and its function is clear, accurate, and thorough. | /3 |

**Total Points: \_\_\_\_\_/ 15**

**Paragraph 2:** Quantitative Traits and Descriptive Statistics

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Identify the quantitative trait you chose to measure/count. | * You have clearly identified a quantitative trait. * You have explained how it will be measured / counted (with units where applicable). | /2 |
| B. Provide a chart to show the data you collected for this trait. | * Your chart has been created in Excel, Word, or a similar program. * Your chart is well organized. * Your chart has a detailed and clear title. * Your chart has appropriate column / row labels with units (where appropriate). | /4 |
| C. State the following statistical values for your data set and explain the meaning of each value—mean, standard deviation, standard error, and 95% confidence limit.  *\*\*\*Note: In the appendix of your report, you must show your calculations for standard error and 95% confidence limit.\*\*\** | * Your value for mean is correct. * Your value for standard deviation is correct. * Your value for standard error is correct. * Your value for 95% confidence limit is correct. * Your work in the appendix for standard error is thorough and accurate. * Your work in the appendix for 95% confidence limit is thorough and accurate. * Your explanation for the meaning of the mean is thorough, and accurate. * Your explanation for the meaning of the standard deviation is clear, thorough, and accurate. * Your explanation for the meaning of the standard error is clear, thorough, and accurate. * Your explanation for the meaning of the 95% confidence limit is clear, thorough, and accurate. | /10 |

**Total Points: \_\_\_\_\_/ 16**

**AP Biology Final Exam: Wisconsin Fast Plants Summary Report RUBRIC – Part 2**

Osbourn Park High School, 2015-2016

**Paragraph 3:** Parent Generation Plants

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| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Describe the difference between the stem colors of the P1 and P2 plants. Include photographs to support your description. | * Your description is clear, accurate, and thorough. * You have included a clear photo of the stem color of the P1 plants. * You have included a clear photo of the stem color of the P2 plants. | /3 |
| B. Describe the difference between the leaf colors of the P1 and P2 plants. Include photographs to support your description. | * Your description is clear, accurate, and thorough. * You have included a clear photo of the leaf color of the P1 plants. * You have included a clear photo of the leaf color of the P2 plants. | /3 |

**Total Points: \_\_\_\_\_/ 6**

**Paragraph 4:** F1 Generation Plants

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Identify the stem and leaf colors of your F1 plants. | * You have correctly identified the stem color of the F1 plants. * You have correctly identified the leaf color of the F1 plants. | /2 |
| B. State which stem color is dominant and which is recessive. Include a monohybrid Punnett square and text explanation to justify this statement. To create a Punnett square, you will need to assign each stem color a dominant allele (“A”) or recessive allele (“a”). Keep in mind that both parents are purebred for the trait of stem color (i.e., one parent is homozygous dominant and the other is homozygous recessive). | * Your statement is correct. * Your Punnett square is correct. * Your text explanation is clear, accurate, and thorough. | /3 |
| C. State which leaf color is dominant and which is recessive. Include a monohybrid Punnett square and text explanation to justify this statement. To create a Punnett square, you will need to assign each leaf color a dominant allele (“B”) or recessive allele (“b”). Keep in mind that both parents are purebred for the trait of leaf color (i.e., one parent is homozygous dominant and the other is homozygous recessive). | * Your statement is correct. * Your Punnett square is correct. * Your text explanation is clear, accurate, and thorough. | /3 |
| D. Identify the genotype (e.g., AABB) of your F1 plants. | * You have correctly identified the genotype of your F1 plants. | /1 |
| E. Provide a dihybrid Punnett square to show the passage of BOTH stem color and leaf color from the parent generation to the F1 generation. | * Your dihybrid Punnett square is correct. | /1 |

**Total Points: \_\_\_\_\_/ 10**

**AP Biology Final Exam: Wisconsin Fast Plants Summary Report RUBRIC – Part 3**

Osbourn Park High School, 2015-2016

**Paragraph 5:** Life Cycle

|  |  |  |
| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Identify the purpose of pollination | * You have clearly and accurately identified the purpose of pollination. | /1 |
| B. Describe the process of pollination, and identify the plant structures involved. | * Your description is clear, accurate, and thorough. * You have correctly incorporated two plant structures into your description (worth 2 points). | /3 |
| C. Explain how you pollinated your F1 plants. | * Your explanation is clear, accurate, and thorough. | /1 |
| D. Describe observable changes that you saw in the plant between pollination and seed harvesting. State how long this process typically takes in Wisconsin Fast Plants | * You have correctly described at least two observable changes (worth 2 points). * You have correctly stated how long this process typically takes. | /3 |

**Total Points: \_\_\_\_\_/ 8**

**Paragraph 6:** F2 Generation Plants

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| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. Show a Punnett square depicting a dihybrid cross between the F1 plants and state your expected F2 phenotype frequencies (as fractions and decimals rounded to the nearest thousandth). | * Your Punnett square is correct. * Your fraction frequencies are correct. * Your decimal frequencies (rounded to the nearest thousandth) are correct. | /3 |
| B. Provide a chart to show your observed phenotype (i.e. stem and leaf color) data for the F2 plants (as whole numbers of plants AND decimal frequencies rounded to the nearest thousandth). | * Your chart has been created in Excel, Word, or a similar program. * Your chart is well organized. * Your chart has a detailed and clear title. * Your chart has appropriate column / row labels with units (where appropriate). * Your chart includes whole number data and correct decimal frequencies (rounded to the nearest thousandth). | /5 |
| C. Describe how your observed frequencies differ from your expected frequencies. | * Your description is clear, accurate, and through. | /1 |

**Total Points: \_\_\_\_\_/ 9**

**AP Biology Final Exam: Wisconsin Fast Plants Summary Report RUBRIC – Part 4**

Osbourn Park High School, 2015-2016

**Paragraph 7:** Chi Square Set-Up

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| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. State your null hypothesis and alternate hypothesis | * Your null hypothesis is correct. * Your alternate hypothesis is correct. | /2 |
| B. Identify your observed values for the F2 generation phenotype frequencies (as whole numbers of plants). | * Your observed values are clearly stated as whole numbers. | /1 |
| C. Identify your expected values for the F2 generation phenotype frequencies (as whole numbers of plants) and explain how you determined these values using your Punnett square results from Paragraph 6, Part A. | * Your expected values are clearly stated as whole numbers. * Your explanation is clear, accurate, and thorough. | /2 |
| D. State your calculated chi square value.  *\*\*\*Note: In the appendix of your report, you must show your calculations for the chi square value. You do not need to show calculations for obtaining your expected values, since you already explained how you obtained them in Part C.\*\*\** | * Your value is correct. * Your work in the appendix is thorough and accurate. | /2 |
| E. State your critical value and explain how you determined this value using a critical values chart.  *\*\*\*Note: In this explanation you must identify the number of degrees of freedom for your data and explain how you determined this number.\*\*\** | * Your value is correct. * Your explanation is clear, accurate, and thorough. * In your explanation, you have identified the correct number of degrees of freedom and explained how you determined this number. | /3 |

**Total Points: \_\_\_\_\_/ 10**

**Paragraph 8:** Chi Square Analysis

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| --- | --- | --- |
| **Requirement** | **Point Breakdown** | **Points Received** |
| A. State whether your calculated chi square value is higher or lower than your critical value. | * Your statement is correct. | /1 |
| B. Explain how your value from Part A allows you to draw conclusions. (Do you reject or support your null hypothesis? Do you reject or support your alternate hypothesis?) | * You have clearly and accurately explained how your value from Part A allows you to reject or support your null hypothesis. * You have clearly and accurately explained how rejecting or supporting your null hypothesis allows you to reject or support your alternate hypothesis. | /2 |
| C. Explain what these conclusions “mean” in the context of this experiment. (Does it seem that our fast plants follow a simple dominant / recessive pattern of inheritance for the traits of stem and leaf color?) | * Your explanation is clear, accurate, and thorough. | /1 |

**Total Points: \_\_\_\_\_/ 4**